ROTATIONALLY-RESOLVED INFRARED SPECTROSCOPY OF THE ν_{16} BAND OF 1,3,5-TRIOXANE

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1,3,5-trioxane is the simplest cyclic form of polyoxymethylene (POM), a class of formaldehyde polymers that has been proposed as the origin of distributed formaldehyde formation in comet comae and a potential source of formaldehyde in prebiotic chemistry. Although claimed POM detections have since been proven to be inconclusive, laboratory simulations of cometary conditions have yielded trioxane and other POMs[a].

While the microwave spectrum of 1,3,5-trioxane has been studied extensively[b], to date only one rotationally-resolved ro-vibrational spectrum has been published[c]. Here, we present our studies of the ν_{16} band of gas-phase trioxane centered at 1177 cm^{-1}. Trioxane was entrained in a supersonic expansion of argon and characterized by continuous-wave cavity ringdown spectroscopy using an etalon-stabilized external-cavity quantum cascade laser[d]. Rotationally resolved spectra were obtained with less than 15 MHz resolution.

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[a] Cottin, H., Bénilan, Y., Gazeau, M-C., and Raulin, F. Origin of Cometary Extended Sources from Degradation of Refractory Organics on Grains: Polyoxymethylene as Formaldehyde Parent Molecule. *Icarus* **167** (2004), 397-416.

[b] Oka, T., Tsuchiya, K., Iwata, S., and Morino, Y. Microwave Spectrum of s-Trioxane. *Bull. Chem. Soc. Jpn.* **37** (1964), 4-7.

[c] Henninot, J-F., Bolvin, H., Demaison, J., and Lemoine, B. The Infrared Spectrum of Trioxane in a Supersonic Slit Jet. *J. Mol. Spect.* **152** (1992), 62-68.

[d] Gibson, B.M. and McCall, B.J., contribution TJ08, presented at the 69^{th} International Symposium on Molecular Spectroscopy, Urbana, IL, USA, 2014.